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A common curriculum for welding and cutting courses in agricultural education programs in Iowa

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A Common Curriculum for Welding and Cutting Courses in Agricultural Education Programs in Iowa

by

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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

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ABSTRACT

The purpose of this creative component is to form a common curriculum guide for the instruction of a year-long welding and cutting course in a high school education program. The importance of a well-rounded curriculum for agricultural mechanics subjects, such as welding and cutting, can be seen in programs around the state of Iowa who prepare students to work in professions such as manufacturing or various skilled trades. Materials have been gathered from five years of instructing high school agricultural education welding and cutting courses, and many years of welding industry experience from my grandfather's and husband's custom welding shops, and having at one point been certified through a partnership with Des Moines Area Community College (DMACC), Vermeer, and Iowa Workforce Development in Metal Inert Gas (MIG) Welding for Manufacturing and American Welding Society (AWS) Gas Metal Arc Welding (GMAW) in the following positions: 1G-1, 1G-UL, 3F, and 4F positions. This information was composed into a document which includes the following: A curriculum map, course pacing guide, a materials list, various worksheets and PowerPoints. This guide will to be given to new Iowa agricultural educators at the mid-term conference the fall of their first year of instructing, as well as to any instructors needing assistance with course planning for their various welding and cutting courses

CHAPTER 1: INTRODUCTION

Introduction

As the need for professionals in skilled trades continues to grow it is no surprise that cutters, brazers, and welders are in demand. Recent projections suggest that 375,000 welders will be needed by the year 2023 (American Welding Society, n.d.). According to the Bureau of Labor Statistics (2019), "Employment of welders, cutters, solderers, and brazers is projected to grow 3 percent from 2018 to 2028. The nation's aging infrastructure will require the expertise of welders, cutters, solderers, and brazers to help rebuild bridges, highways, and buildings" (Para. 6). Those skilled individuals will not only work on infrastructure but also in custom shops, on agricultural equipment, and as private welders for individuals such as farmers, schools, and communities.

As an agricultural educator, I have always had an interest in the area of agricultural mechanics. My passion for the area only grew stronger when I took my first and only required teacher preparation course for agricultural mechanics at Iowa State University (ISU). The lack of curriculum depth startled me. We focused mainly on woodworking; however, we learned only one tool and its operation. We then created a project as a class as an assembly line. We later somewhat touched metals and welding, as well as small gas engines. The latter two subject areas were very much afterthoughts. Knowing that I had a deeper knowledge and grasp of the content learned in this course, I sought out other opportunities to learn, both in other ISU agricultural mechanics courses and at DMACC. However, in discussions with peers, it was obvious that their knowledge base was not there before taking this course, and most felt their competency associated with agricultural mechanics topics was not enhanced upon completing the aforementioned course.

As a professional in a field, which I feel is often judged by the performance and knowledge of her peers, this gap in their training and preparation reflects on me as well. Being someone who is often turned to for help in agricultural mechanics, it can be hard to share my materials and expertise with others unless I am able to share their expertise. Putting together these materials to be accessed by agricultural educators in Iowa, both new and tenured, allows for the opportunity for agricultural educators in my state to have quick access to high quality materials that they are able to tailor to their programs. It has also served as a perfect way to contribute to Iowa agricultural educators and myself an organized curriculum guide that is aligned with Iowa Agricultural Education Standards, thereby strengthening Iowa's agricultural education programs, including my own. The role of teaching welding and cutting in agricultural education is varied. While I was not able to find statistics on how many agricultural educators teach such a course, in informal discussions I found that many of my peers, locally and across the state, were tasked with instructing a welding and cutting course. In addition, I have been an instructor in some capacity, substitute or full time agricultural educator, in at least six districts where the agricultural educator was the welding and cutting instructor. It was also through these informal discussions that I also found that if the agricultural educator in the school was not in charge of such courses, the industrial technology educator was. Besides assisting agricultural educators, I am sure industrial technology teachers will benefit as well as the DMACC welding program. Many of DMACC's incoming welding students are recent high school graduates whose training prior to DMACC was an agricultural education course or industrial technology course in welding. If schools can acquire the certifications for the DMACC credits, students can bypass lower level courses and enhance their high school/college experience; if the high schools do not get certified to offer DMACC courses for college credit, at least students will have had exposure

to the topics in lower level welding courses. It is my belief that this curriculum could assit in making a more common curriculum across various programs so that students leaving agricultural education programs are entering community colleges or the work force with similar levels of knowledge and skills relating to welding and cutting processes.

Purpose & Objectives

The purpose of this creative component was to create a document which outlines and provides a common year-long welding and cutting curriculum for agricultural educators in Iowa. To accomplish this purpose, the following objectives were established:

1. Identify the importance and need for a common curriculum for welding and cutting courses in agricultural education programs in Iowa.
2. Create a curriculum map outlining the power standards, learning targets, Bloom's level of taxonomy, vocabulary, units, and assessments (i.e., formative and summative) for basic and advanced welding and cutting courses.
3. Develop and describe strategies for instructing students in the methods and procedures for welding and cutting processes.

Need

In an interview with DMACC Welding Instructor Marcus Samson, (personal communication, August 7, 2019) he said, "We see about 80 new students per year. Most of them have welding experience, whether from school or work. If we could have kids coming in with better foundational knowledge and skill it would make my job easier."

Based on my personal experience as an agricultural education teacher and having family in the welding profession, I know that not all future welders pursue post-secondary education. Some enter the job force directly out of high school or even before completing a high school

diploma or passing the High School Equivalency Test (HiSET, formally GED). While this probably isn't a huge deal to most, it should be. They are the welders building our infrastructure, bridges, skyscrapers, cars, etc. While some welders work on art-based welding projects or private fixings of yard equipment, the majority do not. They are building our world and the products we use daily. Would you want a doctor who took only high school biology operating on you? Then why settle for a welder who took only one course in high school.

The AWS offers certifications in welding processes, which will show a mastery of the various welding techniques. The AWS cites the importance for certifications as they show a competence in welding, potential for higher salary, and a commitment to the profession.

The problem begins with the lack of teacher preparation. As I stated earlier, my undergraduate coursework in preparing me to instruct agricultural mechanics, particularly welding, was much less than adequate. In visiting with many of my peers, the feeling was mutual. When asked what curriculum they used to instruct welding, their response was usually, "I make it up as I go."

In Iowa 84.4% of agricultural educators said that agricultural mechanics, including welding, were important to the Iowa agricultural education curriculum, that they enjoyed teaching it, but unfortunately they did not feel competent in teaching such topics when compared to other areas. (Byrd, Anderson, & Paulsen, 2015) Therefore, unless these teachers benefitted from an adequate curriculum in secondary and post-secondary instruction or sought training from a trade school or apprenticeship programs, the cycle of inadequate and subpar information and skills continues.

In addition to helping other educators with welding and cutting curriculum, the completion of this project will assist me in my own program as my school evaluates the

importance and need for welding and cutting courses in our curriculum. A welding and cutting course is an expensive course to run for a semester and when a school runs both a basic and advanced semester course with two sections each it will spend quite a bit of money. This course is vital to my students as an area of exploration. Some will take it to explore the profession before they pursue it as a career. Others will take it as an area of agriculture that is also artistic. Students will benefit from both the curriculum and college credit offered, but each group will experience the course from a viewpoint that makes sense to them. Not only will students benefit from the curriculum but so will the school and community. The school benefits by being able to boost the opportunity for post-secondary credit, and my community benefits from the students receiving certifications through OSHA and blueprint training. Manufacturing is one of the larger industries in our area. As these students leave Prairie City-Monroe (PCM) High School and enter the workforce they will have certifications and skills to put on their resume. Some, although not all, employers will recognize the certifications from my course, but I am sure potential employers will recognize the importance of training in these areas. If students enter the workforce locally straight out of high school there options are small retailers, such as Casey's or Dollar General, the local cooperative, to work for themselves, or to work at a manufacturer such as Vermeer, John Deere, or Co-Line welding. The local retailers and cooperative are not hurting for employees, in fact, they are rarely hiring. The local manufacturers often have positions open as they expand business and see the usual turnover of employees to retirement and loss of employees due to lack of training (Luke Knight, personal communication, October, 2019).

This curriculum guide will serve as a reference to what is being used in the PCM Agricultural Education Program which is aligned to and allows for students to receive college credit from our local community college (i.e., DMACC). While the reference materials will not

always be suitable for all instructors, they will serve as a guide to what can and should be addressed in a year-long welding and cutting course. The course is divided into semesters, with the first being more of a basic welding and cutting course, and the second designed for an advanced welding and cutting course. This course aims to train students in some welding and cutting processes, but due to the nature of the course and my program needs, serves more as a course which allows for career and skill exploration in the areas of welding and cutting.

Use of Manual

The reference materials in this project will allow my welding and cutting courses to be taught consistently, from semester to semester, as well as in the possibility of my courses being taught by a student teacher. It will also allow for a more consistent curriculum for agricultural education welding and cutting courses across the state of Iowa, improve the confidence of welding and cutting instructors, and improve the quality of skills and information given to students in such courses.

Definition of Terms

Acetylene- a volatile gas / fuel used in cutting and brazing / welding processes.

Arc welding- sometimes referred to as stick welding; process of using electrodes as filler material to combine base metals. The formal name for this welding process is Shileded Metal Arc Welding (SMAW).

Articulated course- courses that are similar to post-secondary courses and allow students to earn both high school and post-secondary credits for, see concurrent enrollment or dual enrollment.

AWS- American Welding Society, “Founded in 1919, as a nonprofit organization with a global mission to advance the science, technology, and application of welding and allied joing and cutting processes including, brazing, soldering and thermal spraying. AWS strives to move the

industry forward in both thought and action, as well as inspire new generations to see the exciting career opporutnities available today" (American Welding Society, n.d.).

Base metal / material(s) - materials to be combined to make a project.

CASE- Curriculum for Agricultural and Science Education. The CASE curriculum incorporates science inquiry for "lesson foundation and concepts…using activity-, project-, and problem-base instructional strategies" (CASE, n.d., para. 3).

Concurrent enrollment- courses that students earn both high school and post-secondary credits, see dual enrollment.

Dual enrollment- courses that students earn both high school and post-secondary credits, see dual enrollment.

Electrode- consumable used in arc welding that is melted to fuse together base metals.

Filler material- any consumable used to join base metal/materials together.

GMAW- Gas Metal Arc Welding, see MIG.

GTAW- Gas Tungsten Arc Welding, see TIG.

MIG- Metal Inert Gas, also referred to as wire welding or GMAW.

OSHA- Occupational Safety and Health Administration, a group whose primary focus is keeping America's workforce safe by creating policies and procedures for employers and workplaces to follow.

SMAW- Shielded Metal Arc Welding, see Arc Welding.

TIG- Tungsten Inert Gas welding, highly skilled welding process that utilizes frequency, a torch, and filler material to bond materials together.

CHAPTER 2: LITERATURE REVIEW

As the AWS predicts a shortage of 450,000 welders by the year 2022, there is obviously a need to train students and guide them towards this career area, as well as the need to have

teachers prepared to instruct and guide students in the content (American Welding Society, n.d.). So what is available to agricultural educators at this present time?

The first curriculum that comes to mind that is readily available and widely regarded as excellent curriculum is Curriculum for Agricultural and Science Education (CASE). While it is a fantastic curriculum, it does drop the ball in the way of agricultural mechanics. In recent years they have developed and released Agricultural Power and Technology (APT) and Mechanical Systems in Agriculture (MSA), but these are not feasible in many programs. The start-up costs for these begin at around $14,000 plus, not to mention consumables, training fees, and time to train. Another challenge with the two courses is that they do not touch on welding and cutting curriculum, which happens to be a part of many agricultural education programs that have an agricultural mechanics strand in Iowa.

In 1985, Bruce Barker found through his research on the disparity between small and large schools course offerings that "this study confirms that most students who attend small high schools face curriculum disadvantages uncommon to students who attend large high schools" (Barker, 1985, p. 37). In his study small schools and large schools both offered nearly the same number of welding courses, but their ability to deliver similar programs in rigor proved difficult. My curriculum focuses more on depth of knowledge behind welding and cutting topics rather than on the technology implemented. Furthermore, in Dave Cornelius's special report (2011) Mona Mourshed, partner and co-leader of Global Education Practice of McKinsey and Co., is cited for her findings regarding career training. She found that 56% of students entering the workplace lacked specific career training, such as welding. Moreover, it was found in a study that while 73% of 25-44 year old welders had a high school education, only 25% have some college, and only 2% have a Bachelor's Degree" (Derwart, Putnam, Jones, & Macdonald, 2008).

From this we can infer that the course offerings in welding from programs such as agricultural education are vital to the welding industry.

In another study it was concluded that 75% or more of agricultural educators agreed that they needed to have welding knowledge and skills (Hainline & Wells, 2019). This same study alluded to more teachers putting emphasis on the need for MIG welding due to the ease of teaching it in addition to a wider industry need for it. However, it is my belief and a general consensus with DMACC professor and AWS welder, Bill Morgan, that with proper training and knowledge the ease of teaching ARC welding could equal, if not surpass, the ease of MIG welding instruction (personal communication, August 18, 2019).

Including welding, many of the other areas my curriculum covers are included in the areas found to be important to agricultural educators (Hainline & Wells, 2019). In conclusion the need for a streamlined curriculum in welding and cutting processes is needed. Besides aiding inexperienced teachers, it aids students in employability and skills, post-secondary programs in training students, and employers in finding skilled employees.

CHAPTER 3: METHODS & PROCEDURES

Program Used

Google Docs was the word processor I selected to create my welding and cutting curriculum handbook. In order for it to be easily accessible I looked at several options including Microsoft Word, Google Docs, Google Sheets, and Pages. Unfortunately, not long after starting my creative component, my school district removed all Microsoft products from our computers due to pricing. With Google Docs being free, its ease of access solidified my choice. Anyone with the Google email, GMail, can quickly access the documents (edit, view, comment), and anyone without one can receive a link to view the documents. I am also pleased that Google Docs

documents can be downloaded into several formats allowing for the utilization of any program an educator has access to with minimal formatting issues. I am also highly comfortable with Google Docs due to my school's use of it. I am able to easily upload worksheets, pictures, and other miscellaneous items with extreme ease.

Planning Materials

The need to sit down and put my curriculum together has been a need of mine for all five years of my ag teaching career. While I do not just throw some random ag topics out there, I have never really had any of it written down or organized. I will honestly admit that I also never wrote out my standards and benchmarks. I had a general pairing that I used in my program of study that my school administrator merely approved because as long as something was there, he didn't really care. As my school has progressed through our Teacher Leadership Programming and PLCs, the need for me to have an organized curriculum grew. With a new administrator this year I also wanted to set higher standards for myself, as she is an administrator I respect. She has expectations that I need and want to meet.

My first step was listing everything I and DMACC assumed needed to be covered in this course. With these two lists I took the topics that overlapped and the ones that I felt were important and practical from each that weren't duplicates and made a master list I call "the non-negotiable topics." I also asked colleagues the topics they needed assistance with for curriculum planning, and nearly all topics on my master list matched with something suggested by my peers.

Materials Used

The information and materials used in this manual comes from the many years assisting my family in their welding businesses; my experiences as a student in secondary and post-secondary welding courses, including having at one point been certified through a partnership of

DMACC, Vermeer, and Iowa Workforce Development in MIG Welding for Manufacturing and AWS Gas Metal Arc Welding in the following positions: 1G-1, 1G-UL, 3F, and 4F positions; and five years of instructing secondary agricultural education courses. I have been instructed and have instructed courses in all types of welding and cutting processes, with the exception of underwater welding, CNC Plasma, and a few other rare types. I chose to incorporate the most common areas across most agricultural education weld laboratories: Oxygen-acetylene cutting, manual plasma cutting, SMAW, GMAW (MIG), and blueprint reading and creation. Due to my lack of welding experience as a professional outside of education, I utilized the assistance of my local community college, DMACC, for help. Their suggestions focused on what is important for incoming students to a post-secondary welding program or those entering the welding workforce to know (personal communication, August 18, 2019).

Organization

There are so many welding and cutting processes, areas of specialty, and knowledge which could be covered in a metal laboratory course. I, therefore, had to keep putting the need of general programs, and mine more specifically, into check. Using my lists and creating a master list of must-cover information, I narrowed down my topics to much more manageable and useful resources.

I then created a handwritten list of units, which I organized into a logical flow of order in a welding course. I then created underlying topics that needed to be covered in each unit. The last step was reflecting on how long I typically took to teach each lesson. This also included assessing and re-teaching if necessary and making a schedule for the course. This assisted me in the visualization of course pacing.

CHAPTER 4: PRODUCT

Welding and Cutting Processes for the Iowa Agricultural Education Classroom Handbook is to serve as a guide for teaching a year-long welding and cutting laboratory agricultural education course. I used the handbook as my AgEdS 599 Creative Component Project to meet the requirements of the Master's Degree in Agricultural and Life Sciences Education (see Appendix A).

CHAPTER 5: REFLECTION

Reflection

When I reached the point in my Master's program that I had to decide on a creative component, I found myself torn. The overwhelming advice given to me by other ISU Agricultural Education Master's program completers, current agricultural education Master's students, and ISU Agricultural Education Staff was to be sure that I created something to help me as a teacher, which could also be used by other teachers. As an educator I have a need for so many resources, and I struggled narrowing down my exhaustive list. I finally settled on welding and cutting curriculum because it helps me, my peers, and my profession.

Once my topic was selected, the task of narrowing down information began. As I stated previously, the many areas and processes in welding and cutting are immense and the information that one could cover could take years. I wanted to narrow my curriculum to a year of information, that in my belief, prepared them to enter either our local community college in welding or in a career for one of our local manufacturers. In accumulating resources I did hit some snags as the machines I use different same across the board, so not all materials could be assembled or all issues addressed for those struggling in their course. I also would hope my informal training through my family growing up, as well as my formal training through Vermeer

and DMACC's partnership program and continuing education that I would be able to make a curriculum that had value to agricultural educators across the state.

Impact

Creating my handbook allowed me to perform a self-assessment as an educator and the effectiveness/relevance of my current curriculum. I could determine what needed to be taught, how to teach it, and why. I had to face a deep personal reflection of myself, most only face once they hit so many years of teaching and have time to do this reflection or they are forced to do this reflection due to a poor evaluation by an administrator. I knew what I was talking about, but if someone had to take over my classroom they could not replicate it because of my lack of lesson planning materials and their lack of knowledge to follow my sub-par lesson plans.

Not only has this impacted me, but I also know several educators who have found out I am completing this and are anxiously awaiting access to this handbook. I hope it helps their programs as much as I know it will assist mine. I also hope it helps DMACC and the workforce of agricultural educators in Iowa in training the next generation of welders.

Recommendations

My plan for this handbook is to make it accessible to those educators interested in the curriculum. I also know ISU's Department of Agricultural and Life Sciences Education often hosts summer workshops, and I could provide this resource to those attending as a goodie bag item. A handout detailing how to email me for the curriculum would also be provided. Once I receive an email I would quickly send my materials as well as collect user information to check back in on the curriculum and that teacher's needs. I also hope to present a workshop about my welding curriculum at the New Teachers' Mid-Year Conference in November, as well as possibly present the same workshop at the Iowa Association of Agricultural Educators' (IAAE)

Summer Conference in 2020. While this handbook is not all inclusive, it is a start to what I believe to be a well-balanced, organized, and rigorous curriculum for a welding and cutting laboratory. Teachers should assess its value for their program and make changes as necessary to fit their program's needs. Such changes could be availability of machines or consumables, the need for more of one type or welding or cutting process, students' abilities or disabilities, and program budget to name a few.

Extensions

I also plan to host a workshop at my school to give teachers there hands-on instruction to build confidence in their welding and cutting laboratory knowledge and skill.

I will continue to add to it as I find updated resources and as my program's needs change. If possible I hope to collect data from the teachers who request this handbook and/or the attend my workshop to see if either resource improved their course rigor, their confidence in instructing such courses, and student, parent, administration, and community approval of such courses.

This handbook could be utilized by programs outside of Iowa with alterations to the standards depending on what their state mandates for curriculum. I kept most content as generalized as possible due to programs not having uniform equipment and tools.

What Could Be Done Differently?

If I had had more time to complete this handbook, I would take the time to address some of the broader topics that I could not cover, such as various machines. I would probably poll many programs and find the top one or two machine types and create "how-to operate" manuals and PowerPoints for those machines. I would also spend time creating the same for my machines, but since mine are different in that they are tri-process machines (SMAW, GMAW,

GTAW), I use argon for shielding gas, as opposed to CO2, among other differences that the machines I intend to purchase in the future have to update my laboratory.

Summary

My final thoughts on this handbook are that I am proud of where it has ended - based on where I began - as well as its intended purpose. Before organizing these materials I had no lesson plans or organized resources for my class. If asked for a resource, I either had nothing or would need to create something, or in the time it would take me to find the resource, the requestor would find something to use instead. Now I have a document which can be accessed, shared quickly, used in my course and was well thought out, rather than just being "good to know."

It cost me a lot of blood, sweat, and tears to get this done, but it was worth it. I have a resource I can use and one that I can share with other educators. The development of this handbook made me reflect on my own abilities, shortfalls, and successes as an educator. It will allow me to spend more time improving my other courses and other aspects of my program, and I will have more time to spend with my family. This handbook will also serve to reduce the stress of other teachers with whom I share it.

This creative component put my graduate school training to work. When developing the handbook, I had to think not only about youth learners but also adult learners (my handbook is for educators), not to mention the strategies I had to think about and put together as I worked through each unit and how to deliver its content.

While I know there will be changes, both certain and possible, I am proud of the product I have created and know that learning is on-going and my project should be as well. I hope my administrators and students find this handbook to be useful in assessing my curriculum.

Furthermore, I hope other agricultural educators find it to be useful and reduce their planning time and stress level.

Final reflection of graduate program

Overall, I found my experience in completing the Master's Program in Agricultural and Life Sciences Education to be very worthy of my time. My goals for completing my Master's were to (1) practice what I preach (Everyone can still learn something!), (2) pursue a level of education to better myself, which I dreamed about as a kid, and (3) make more money.

In regard to goal number one, to practice what I preach (Everyone can still learn something!), I really enjoyed all of my classes. From taking CASE courses over the summers as electives, learning about adult learners, and rediscovering educational learning theories, it was all a breath of fresh air compared to my usual professional development of useless book reading or conferences about PLC's. One class stood out, AgEdS 510. Dr. Greg Miller taught this course, and whenever I was asked what the course was about, the best layman's terms I could give were, "Researching, research, about research." It challenged me. At one point I can remember thinking, "What was I thinking? I am not cut out for this! My Master's program is over before it even really started!" I had heard the warnings from peers, to take this course first and by itself. I didn't listen. In fact, I took it while taking six additional credits, teaching full time, being a mother to two year old "twinadoes," and running a small farm. Obviously, I made it, but if I could go back I would and take it as a stand-alone course and improve my grade, and dive deeper into the material than I did the first time, though, admittedly I reference the book from this course weekly, either for a student doing research or myself.

Along with AgEdS 510, my other courses really impacted my graduate school experience, but more so in regards to this creative component. AgEdS 520, an instructional

methods course, really challenged me to reflect deeply and analyze critically. These skills came in handy as I developed the curriculum handbook for this project. It was easy enough to insert the materials I used for content, but being able to explain why and how proved difficult. Without AgEdS 520, my reflections would not have been as well done as they were.

Two other courses that stand out now that I am farther in my graduate program are AgEdS 550 Foundations of Agricultural Education and AgEdS 524 Program Development and Evaluation in Agricultural and Extension Evaluation. These two courses have challenged me academically in regard to my ability to write scholarly, to use APA citations, and to research. If I could I would take the AgEdS 524 and 550 courses first in my program, followed by or in conjunction with AgEdS 510. It was unfortunate that my pacing for my graduate program did not allow this with course offerings only at certain times, but I still had a wonderful academic experience and gained knowledge and skills that will continue to benefit my students and classroom, my own children as they enter the world of academia, and myself as I continue in the profession of agricultural education.

Goal number two was to pursue a level of education to better myself I dreamed about as a kid. As I near the end of the tunnel and the light is becoming clearer and no longer appears to be attached to a train or Peterbilt, I find myself very proud of where I am and what I have accomplished. A 10 year old Amber would be proud as would my fifth grade teacher Mr. Dan Koss; my sixth grade science teacher Mrs. Tracy Nalavenko; my eighth grade Spanish and social studies teacher Mrs. Frazier; and my ninth and 12th grade English teacher Mrs. Grier. Those four teachers saw a kid with not the best life and pushed me to see that it’s not where you come from but where you go and what you do that defines you; to always do my best when life hits you like

a hurricane and fight your way through the storm because when it passes, as it always will, the sun will come out and there will be a rainbow.

Goal number three was to make more money. With the completion of this degree I will move up a pay grade at the start of the next school year. In the meantime, though, for completing graduate credits I move a lane into the B.S. + 24 graduate credits. This means about $1,500 more a year. When I move a pay grade I go up about $5,000 in my current district. In other districts, the increase is much better.

Finally, I am so glad I took the chance and started my graduate program. I would go back and do it again, only long before I had twins and bought a farm. I would also change the order of courses I took, and I would absolutely recommend Iowa State University's Department of Agriculture and Life Sciences Master's Program to any who ask.

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APPENDIX A

A Common Curriculum for Welding Courses in Agricultural Education Programs in Iowa Handbook

by

Amber Samson

For this handbook there will be a worksheet or link to the website needed for each activity. I chose Google Drive, primarily Google Docs, because individuals can make copies of a document without altering the original with the option to always come back to the original should you alter or lose your copy of the document and need a fresh start. Anything written in red are teachers' notes. This could include tips and tricks for the lesson, resources to find items, and/or justification for the use of this resource. The red should be erased before giving copies to students. There are links to other Google Drive platforms, such as Slides and Sheets. This allows the document to be smaller with the ability to link to the other information quickly without losing your place in the Google document. As always, if an instructor using this has questions, he/she is welcome to reach out to me.

The curriculum map with standards, learning targets (both teacher and student-friendly language), level of thinking (Bloom, Marzano, or Webb), implied learning targets/assumed knowledge, vocabulary, unit, and guide to grading (Common Formative Assessments and Summative Assessments) can be found at this link: https://docs.google.com/spreadsheets/d/1BEL2TzONyWiqPoZv82C4g_BJtI0c-tL4wokOL3aZv3o/edit#gid=1205289688

As you look to incorporate these topics and materials into your classroom you will need to modify it to fit your needs. Since I am articulated (dual enrollment) with DMACC, I must cover the safety (OSHA) and blueprint topics and cover them in entirety. My suggestions are to look at funding, student interest, and local employer or community college needs as you adjust the information provided here. If your school has many accidents in the agricultural education metal and cutting laboratory, then emphasize the safety unit. If you have plenty of funds and your students have the ability to practice the employability skills in other courses or through other programs, cut out the employability unit and increase days in the metal and cutting laboratory doing welds, cuts, and projects. You must make it your own and fit your students', your program's, your community's and your needs, interests, and abilities.

1st Semester FALL - Basic Welding and Cutting Course

1) 4 days - FFA/DMACC
2) 12 days - OSHA 10 Certification (concurrent enrollment)
3) 4 days - employability skills
4) 5 days - reading measurement tools - tape measure, calipers, micrometers
5) 1 day - shop orientation and cleaning
6) 2 days - welding and cutting equipment
    - hand tools (hammers, grinders, etc.)
    - large tools (drill press, bench grinder, etc.)
7) 12 days - oxygen and acetylene and plasma cutting
8) 17 days - SMWA (Arc) welding
9) 7 days - GMAW (MIG) welding

10) 5 days - OSHA optional modules

11) 20 days - welding projects

- 10 days small project of their choosing (plan/weld/clean/paint)
- 5 days Bucket of Junk (plan/weld/clean/paint)

12) 1 day - semester test and clean

2nd Semester SPRING - Advanced Welding and Cutting Course

1. 4 days - FFA/DMACC
2. 20 days - Blueprint Reading
    - Section 1: 3 days
    - Section 2: 5 days
    - Section 3: 4 days
    - Section 4: 4 days
    - Section 5: 3 days
    - Final Test: 2 days (multiple chances to pass, if pass on first attempt they can work on FFA items)
3. 5 days - Shop Safety, Orientation, Clean, and Tools Revisited
4. Projects:
    - 10 days - Project 1: Artistic - Blueprint, ARC/MIG, clean, paint/clear coat
    - 10 days - Project 2: Small - Blueprint, ARC, clean, paint/clear coat
    - 10 days - Project 3: Small - Blueprint, MIG, clean, paint/clear coat
    - 10 days - Project 4: Medium - Blueprint, ARC, clean, paint/clear coat
    - 10 days - Project 5: Final: Bucket of Junk - Blueprint, ARC, clean, paint/clear coat

- 10 days - built in blunder days - If I am absent students cannot be in the shop, also built in for mess-ups, weather doesn't cooperate to paint, etc.

5. 1 day - semester test and clean

1st Semester FALL - Basic Welding and Cutting Course: 90 days of 45 minute periods (approximately)

1. 4 days - FFA/DMACC

This unit you would need to tailor to your program and your students. I spend these days revisiting how to use the record book system AET, discussing the county fair and State Fair classes so they can think about what they can do over the course of the semester to participate in these shows, and the final day DMACC comes and registers them for concurrent enrollment credit. If you are not concurrent enrollment credit or are not allowed to use classroom instruction time for FFA, let me talk to your administration! I strongly urge you to still use it as time to discuss how the projects they make could be exhibited at fairs in FFA or Open Division if FFA is not their thing. I have the students write journal entries and maintain record books and utilize a complete/not complete grade or the rubrics provided by AET for grading this unit.

2. 12 days - OSHA 10 Certification (Concurrent Enrollment)

Whether your course is concurrent enrollment or not, I strongly recommend pursuing the OSHA 10 Hour General Industry Certification for your students and yourself. For $25 through CareerSafe, students can earn a recognized industry certification. It starts with a 25 question pre-test (unscored) to get a baseline of student knowledge and data. Students then complete the required modules (interactive powerpoints ranging from 25-60 slides) on various topics from how to use the system to ergonomics. They then take an assessment over each module that has 10 questions. They must score a 70% (7 questions) to be allowed to continue. If they fail they

may take it again. Teachers have the option to lock the assessment after the second try before the students may complete the third; I do the lock option. I have not had many students fail their second attempt, but it does happen. After two fails I make them at least visit some of the module slides or concepts. They are also to view the questions they missed to see if they can find the correct answer. Once this is completed they will have their assessment unlocked. If they fail the third attempt that module resets and they must watch the entire module again; I have never had this happen. If they fail the fourth attempt the ENTIRE COURSE RESETS! It is important to note that if a student fails a module assessment four times and the course resets, and then he/she repeats the course and fails another module four times, the course resets and locks; he/she must pay an additional $25 to open the course again. I have never had this happen but know it may one day. I give the students their score out of 10 for a grade for each module. If they have to take it 3 times they get an average of the three scores. If I ever have a 4 time taker, he/she would receive the lowest score. This keeps the student accountable and reminds him/her to pay attention to the modules, which are admittedly easy to zone out on. After all required modules are taken, the students take a final of 25 questions on which they must get a 70% or 18 questions correct. They get three tries again and I put in the gradebook as a score out of 25. If they fail three times the course resets. It is important to note that no two module assessments or finals are the same, although questions are similar. It would be nearly impossible to cheat without taking more than a class period or obvious means to do so. Once the final is passed the students' optional modules unlock and the school will be mailed the students' OSHA 10 Card. I like to laminate these for the students. Another tip is to make sure students use their school email address as username and school email password for password. You cannot see these. Also make

sure they use their legal name for registration as their card will read whatever they put in these fields when registering. (For example, Elizabeth should not be Liz.)

https://campus.careersafeonline.com/sign_in.k2

3. 4 days - Employability Skills

(Day 1) This unit I have never done in the past but think it would be a good addition to any and all of my courses. We would open with how we get supplies for this course and that they are all donations. We would then discuss and look at examples of donor letters and as a class draft such a letter. (Day 2) The next day would be spent coming up with a list of local businesses dealing with welding and manufacturing for our area. As a class we would discuss such businesses, what they do, and find the contact information for each one. Students would select their top three choices for potential employers. (Day 3) On Day 3 we would have representatives of the businesses (pre-arranged) would be in class to discuss with students job opportunities at their respective businesses. Students are assigned a business based on top three choices with 15 minute rotations. I tend to find the reps in this career area can sometimes be gruff and/or hard to get to talk and therefore 15 minutes is enough time to discuss their jobs and opportunities at the business. (Day 4) The fourth and final day the students learn to write thank you notes and each student will write one for each business person to whom they spoke. This unit could easily be a weeklong unit if you wanted to bring in one guest speaker a day and/or tour a local business. A few of my recommendations for excellent places to work in Central Iowa are Vermeer (Pella), John Deere (Ankeny), Co-Line (Sully), Local 33 Union (Des Moines), DMACC (Ankeny), Chicago Bridge and Iron (Des Moines), Sargent Metal and Fabricating (Ames), and Quality Manufacturing (Urbandale).

Topics for guest speakers to discuss:

- Position
- Starting pay
- Pay now and spacing between promotions
- Nature of work
- Conditions of work
- Benefits
- Best part of position
- Worst part of position
- Opportunities for advancement

SAMPLE DONATION REQUEST LETTER:

Amber Samson
PCM High School/Diamond Trail FFA
400 E Hwy 163
Monroe, IA 50170
05/27/2018

Representative Name
Business Name
P.O. Box /Street Address
Town, State Zip Code

Dear Representative Name:

I am the agricultural education instructor and FFA advisor at PCM High School in Monroe. As a part of my curriculum I educate students in welding. I have a beginner's welding course where students learn the fundamentals of the weld shop and welding and an advanced welding course where students go more in depth with welding and then plan, fabricate, and finish welding projects.

The interest in welding at my school has far exceeded what I thought it would be. The 2019-2020 school year will be the fourth year for the advanced welding course. I have had so much interest in taking a welding course expressed that I have gone from one section of each course to two sections of each with waiting lists for all! I know I do not need to tell you how important skilled welders are to our country, nor do I need to tell you about the expense of welding supplies, consumables, and materials. I am sure you know this.

I am writing you to see if your business would be interested in donating scrap metal to my program in an effort to reduce our costs, so our budget can be spent on items such as consumables, safety equipment, etc. We would be willing to take any metal type and size you have, and we would be willing to pick it up ourselves. Please let me know if you have any questions or if you would be interested in assisting us with a donation. My contact information can be found below.

Sincerely, Amber Samson
PCM High School/Diamond Trail FFA

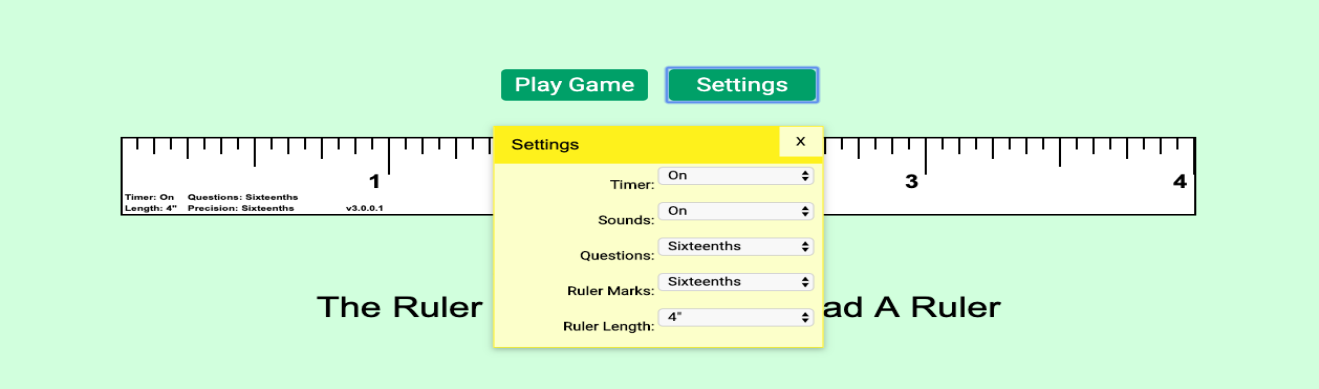
I recommend looking into manufacturers in your area to find possible donors. If you take a drive around town it is easy to start finding places you did not know about or even ask students where their parents work and what they do. Nearly every year I have found a new source for donations, guest speakers, and even another place to reference to students as a potential employer

4. 5 days - Reading Measurement Tools: Tape Measure, Calipers, Micrometers

https://www.cteonline.org/curriculum/lessonplan/reading-a-tape-measure/bDnfJJ

I utilize the lesson plan found on the website above. CTE Online is a free resource and an excellent one at that. The only thing I would add is the day before the third day of this particular lesson plan I have the students use their Chromebooks to play the ruler game. The ruler game is a free website that you can set parameters for from measurement size (eighths, sixteenths, etc.) to the amount of time allowed. At the end of the period we all compete for the best score. Top three get a pop from the teachers' lounge. The next day they do the measuring activity of 20-25 items. Those who are faster can go back to the ruler game and play to try and beat yesterday's top score. If they do, another pop is purchased.

https://www.rulergame.net/new-english-ruler-game.php



5. 1 day - Shop Orientation and Cleaning

Students are given a tour of the shop to see where all items are located including safety equipment, tools, storage, clean-up items, etc. They are also shown what a clean shop and/or a dirty shop look like. Students are then assigned a booth and locker for PPE. We then discuss the procedure for clean-up, each job, and take a look at the upcoming week's jobs and make sure everyone knows where they are to clean and what to do. Students receive a completion grade on a scale of 0-3 for their job. 0 = not there (absent but can make up), 1 = done but not adequate, 2 -

adequately clean, 3 = above adequate. As always, adjust for your needs especially for areas assigned and number of duties. I tend to have 11 welders each welding course period and often have 1-2 gone for illness, sports, etc.

Week of						
Name	**Job**	**MON**	**TUES**	**WED**	**THURS**	**FRI**
	foreman					
	sweep bench tools					
	sweep booths					
	sweep booths					
	sweep open area					
	trash					
	tool cabinets					
	sink					
	inventory					
	other/absences					
	other/absences					

6. 2 days - Equipment

- hand tools (hammers, grinders, etc.)

- large tools (drill press, bench grinder, etc.)

7. 12 days - Oxygen and Acetylene and Plasma Cutting

- 1 day*- oxygen and acetylene: parts, set up, shut down, use, flames, cuts, demo
- 4 days of cutting: straight, bevel
- 1 day*- plasma: parts, set up, shut down, use, cuts
- 4 days of cutting: straight and hole

Run both at the same time. Make students watch both processes of first day(*) They can assist with something they missed that you explained to them. Also, pretend like you can't remember something; it helps test their knowledge (formative assessment). The remaining days they use to practice, get advice and feedback and create a final cut for each assessed cut (4 total). Grade using the rubric below.

https://docs.google.com/document/d/1b8e-F8UkHjfLMsPNqUuiwCcqhuoSnRzh6GXGhSbTwvg/edit

8. 17 days - SMAW (Arc) Welding

- helmet usage, care, electrodes, joints, positions - 1 day
- cheese weld - 1 day
- safety, machine set-up, care, and use (duty cycle)
- demonstration of usage and all welds

  beads- 5 quality beads
- pads: 4 layers
- flat: butt, lap, T: graded using the rubric below
- horizontal: butt, lap, T: graded using the rubric below
- vertical up: T: graded using the rubric below

- vertical down: T: graded using the rubric below

  pipe weld: 2 passes: completion grade: 2 passes, clean

- pipe weld: 1 pass: completion grade: 1 pass, clean

9. 7 days - GMAW (MIG) Welding

- safety, machine set up, care, use (duty cycle), wire, gas
- demonstration of usage and all welds
- beads - 5 quality beads
- pads: 4 layers
- flat: butt, lap, T: graded using the rubric below
- horizontal: butt, lap, T: graded using the rubric below
- vertical up: T: graded using the rubric below
- vertical down: T: graded using the rubric below
- pipe weld: 2 passes: completion grade: 2 passes, clean
- pipe weld: 1 pass: completion grade: 1 pass, clean

10. 5 days - OSHA Optional Modules

Students will complete 1 OSHA module a day for each of the five days. I choose based on student interests. (4 of 5 days are for National Convention when they cannot be in the shop. Other day is for an absence unscheduled or soils judging.)

11. 20 days - Welding Projects

- 10 days small project of their choosing (plan/weld/clean/paint)
- 5 days Bucket of Junk (plan/weld/clean/paint)

  https://docs.google.com/document/d/1ifBs_f6gzrSQvoUXGTQWMVIzGzSHEM_GkQKVyx8Wajk/edit

I primarily use SMAW (ARC) welding in my classroom as my budget is much more accommodating for this, not to mention upkeep of an ARC machine is much easier than a MIG machine. The manufacturers in my area predominantly use MIG, but due to the fact that ARC welding requires more skill I find students that demonstrate a competency in ARC welding make much better MIG welders. As I tell my students, I could teach a monkey to MIG weld and do so in a day.

12. 1 day - Semester Test: Clean

I utilize the cleaning job chart for the entire semester, but the scores are out of 100 (0 = 0, 1 = 50, 2 = 75, 3 = 100). Bucket of Junk is graded using rubric below. My recommendation is to wrap up welding as quickly as possible to give yourself time to clean and do inventory before the start of the next semester. I always seem to run out of time and no agricultural educator has time to be cleaning a shop on breaks, nor should he/she have to.

2nd Semester SPRING - Advanced Welding and Cutting Course: 90 Days of 45 Minute Periods (approximately)

1. 4 days - FFA/DMACC Days

This unit you would need to tailor to your program and your students. I spend these days revisiting how to use the record book system AET, discussing the county fair and State Fair classes so they can think about what they can do over the course of the semester to participate in these shows, and the final day DMACC comes and registers them for concurrent enrollment credit. If you are not concurrent enrollment credit or are not allowed to use classroom instruction time for FFA, let me talk to your administration! I strongly urge you to still use it as time to discuss how the projects they make could be exhibited at fairs in FFA or Open Division if FFA is not their thing. I have the students write journal entries and maintain record books and use a complete/not complete grade or the rubrics provided by AET for grading this unit.

2. 20 days - Blueprint Reading Section 1: 3 days

- Section 2: 5 days
- Section 3: 4 days
- Section 4: 4 days
- Section 5: 3 days
- Final Test: 2 days (multiple chances to pass, if pass on 1st attempt they can work on FFA items)

https://www.welding.org/product-category/books/programmed-learning-packets/blueprint-reading-for-welders-fitters/

Use the book listed above and videos provided to me by DMACC (unable to share); the handbook is $28.00 and an answer key is $10.95. I present and discuss blueprint reading to my

students. I often find Section I is basic math and just a handful of concepts need to be addressed as a whole class. Otherwise they work through Section I on their own and take test on day three. For the other sections the students work individually or with a group, depending on the consensus of the group. I circle the room and check if the group is getting stumped in a certain spot; otherwise I help individuals as needed. At DMACC they read every page and work as a group. I have tried this, and while some groups or in certain parts of sections it is really handy, I have found it mostly annoys the kids and makes the students who work a little slower nervous to speak up about needing help. At the conclusion of all five sections I gather one of every question type from the individual tests and make an overall final. This section is perfect as they must complete a blueprint for each project they complete. If you struggle to get donations and to keep equipment running like I do, I recommend before completing the blueprint reading packet to order the following book and complete before blueprint reading: https://www.welding.org/product-category/books/programmed-learning-packets/symbols-for-welding/?doing_wp_cron=1564496447.6509380340576171875000

It is all symbols and actually greatly helps the students as they complete blueprint reading. It costs $26 and you can get an answer key for $9.95 at the same link. Both the blueprint reading and the symbols book packets come with a test for each section per packet ordered. The website that these books are ordered from - https://www.welding.org/ - contains a lot of great resources for a welding classroom. The site is awesome to work with and ships very quickly. As I look to change plans somewhat from school year to school year, I visit the website often to get ideas and contact them to find resources I may not have otherwise thought of.

I have been asked why blueprints are not incorporated into first semester and there are two reasons, interest and DMACC. For DMACC any lecture course is required to have 15 hours

per credit hour with the blueprint course being three lecture credits for which you need 45 hours of instruction. If I were to try and run the two welding courses, safety (OSHA) which is 1 credit of lab equivalent to 30 hours laboratory and blueprint, I would not have enough time. Obviously, if you are not running this course in conjunction with DMACC or your local community college you would not need to worry about this requirement. With regards to the interest aspect, by keeping students out of the shop laboratory already for all the other topics covered in the fall semester they become restless about getting into the shop. If I were to tack another 45 days in the classroom (which I have done nearly 45 days in past years for other subjects) students would lose interest and motivation in the course.

3. 5 Days - Shop Safety, Orientation, Clean-Up and Tools Revisited

Students are given a tour of the shop to see where all items are located including safety equipment, tools, storage, clean-up items, etc. They are also shown what a clean shop and/or a dirty shop look(s) like. Students are then assigned a booth and locker for PPE. We then discuss the procedure for clean-up, each job, and take a look at the upcoming weeks' jobs and make sure everyone knows where they are to clean and what to do. Students receive a completion grade on a scale of 0-3 for their job. 0 = not there (absent but can make up), 1 = done but not adequate, 2 = adequately clean, 3 = better than adequate. As always, adjust for your needs especially for areas assigned and number of duties. I tend to have 11 welders each welding course period and often have 1-2 gone for illness, sports, etc.

Week of						
Name	**Job**	**MON**	**TUES**	**WED**	**THURS**	**FRI**
	foreman					

	sweep bench tools					
	sweep booths					
	sweep booths					
	sweep open area					
	trash					
	Tool cabinets					
	sink					
	inventory					
	other/ absences-					
	other/ absences-					

They will get the same speech from the first semester of welding in this unit with the added importance of shop safety and cleanliness. I stress to them that since they are working independently they need to be more mindful of their surroundings and caring for the shop and tools. If I ever have to pick up after someone in this course, no matter how small, the whole class will spend however many days I decide cleaning the shop to operating room status. If I ever find a damaged tool after this section (without being notified I would find one), I take the opportunity to complete a project off the table and we take that project's days to read the chapters in the book and do research projects. If I ever find a second broken tool, all remaining projects are gone and we will work in the classroom until the semester test day when we will clean. I understand

accidents happen and tools break, but my students know as long as they tell me and they are straight with me, no one will be punished.

The textbook I prefer is "Welding Principles and Applications 8th Edition," Larry Jeffus. It can be found here on Amazon: https://www.amazon.com/Welding-Principles-Applications-Larry-Jeffus/dp/1305494695

4. Projects **All the welding projects below utilize the same blueprint worksheet and rubric for grading. **

https://docs.google.com/document/d/1_D5zdoU3RvUtfa_yis93IjtDYVnizvei9-6T01QFzT0/edit

https://docs.google.com/spreadsheets/d/1hIEGc3ml77MmFAKqc1ssWPQdg-fo-gLRgQJK0meDTNo/edit#gid=0

10 days - Project 1: Artistic - Blueprint, ARC/MIG, clean, paint/clear coat

10 days - Project 2: Small - Blueprint, ARC, clean, paint/clear coat

10 days - Project 3: Small - Blueprint, MIG, clean, paint/clear coat

10 days - Project 4: Medium - Blueprint, ARC, clean, paint/clear coat

10 days - Project 5: Final: Bucket of Junk- Blueprint, ARC, clean, paint/clear coat

10 days - Built-in blunder days - If I am absent students cannot be in the shop, also built in for mess-ups, weather doesn't cooperate to paint, etc.

I primarily use SMAW (ARC) welding in my classroom as my budget is much more accommodating for this; not to mention upkeep of an ARC machine is much easier than a MIG machine. The manufacturers in my area predominantly use MIG, but due to the fact that ARC welding requires more skill I find students that demonstrate a competency in ARC welding make much better MIG welders. As I tell my students, I could teach a monkey to MIG weld and do so

in a day. With student projects they tend to shoot for the moon as well, which is good, but it can be rough on a budget. More ARC welding means less money towards projects that may never be finished or finished well. Also my school does not allow me to charge a fee for courses, so whether we use 10 lbs of electrodes or 10,000 lbs, my budget remains the same.

5. 1 day - Semester Test (Clean)

Utilize the cleaning job chart from entire semester but the scores are out of 100 (0 = 0, 1 = 50, 2 = 75, 3 = 100). Bucket of Junk graded utilizing rubric below. My recommendation is to wrap up welding as quickly as possible to give yourself time to clean and do inventory before the start of the next semester. You always seem to run out of time and no agricultural educator has time to be cleaning a shop on breaks, nor should he/she have to. I use the same final in both classes, although different metal and the requirement for a blueprint are much different.

Guiding Questions				
What will we prioritize in our teaching during this time period or instructional unit? (Which standards or objectives?) What do we want students to know and be able to do at the end of this time period or instructional unit? (What are the learning targets?) What evidence will we see if students successfully learn these skills and concepts? (What will the assessment items show?)				
Bloom's Taxonomy (Revised)		**Marzano's Taxonomy**		**Webb's Depth of Knowledge**
Remembering Understanding Applying Analyzing Evaluating Creating		Level 1: Retrieval Level 2: Comprehension Level 3: Analysis Level 4: Knowledge Utilization Level 5: Metacognition Level 6: Self-system thinking		Recall and reproduction (DOK 1) Skills and concepts (DOK 2) Strategic thinking/complex reasoning (DOK 3) Extended thinking/reasoning (DOK 4)
Constructed Response Rubric:				
	Beyond Proficiency (5)	**Proficiency (3)**	**Partial Proficiency (2)**	**No Proficiency (0)**
Question Responses	The student gives a complete explanation of what was done and why. In addition, the student provides some alternative thinking about how this applies in other situations.	The student gives a complete written explanation of what was done and why it was done.	The student cannot thoroughly explain what was done and why it was done. The explanation is vague, difficult to understand, or doesn't completely match the process.	The student is unable to explain what was done and why it was done.
Performance Assessment Rubric:				
	Beyond Proficiency (5)	**Proficiency (3)**	**Partial Proficiency (2)**	**No Proficiency (0)**
Project	The student is able to create a	The student is able to create	The student is able to create a	The student is

Creation	project using all of the required tools and more.	a project using all of the required tools.	project using most of the required tools.	unable to create a project using the required tools.
COMMON Performance Assessment Rubric Work Time:				
	Beyond Proficiency (5)	**Proficiency (3)**	**Partial Proficiency (2)**	**No Proficiency (0)**
Use of Class Time	Used time to best advantage.	Wasted only a small amount of time.	Time used fairly well.	No effort was made to use time wisely.

WELDING I: Welding in Agricultural Mechanics								
Power Standard	**Learning Targets: Students will be able to.....**	**Learning Targets: I CAN.....**	**Level of Thinking (Bloom, Marzano, or Webb)**	**Implied Learning Targets/ Assumed Knowledge**	**Vocabulary**	**Unit**	**Assessments**	**Dates**
CRP.01- Act as a responsible and contributing employee/CRP.01.03- Identify and act upon	Utilize the Iowa FFA and National FFA Website and AET to: 1. Research SAEs 2. Maintain their SAE 3. Research	1. Identify a SAE 2. Maintain a record book on AET 3. Maintain a SAE 4. Participate in FFA	1. Remember/Understand 2. Apply 3. Apply/create/evaluate 4. Apply	1. Knowledge of SAE, AET, FFA	SAE AET FFA Record book	FFA Co-Curricular	**<u>CFAs:</u>** Regular checkpoints: 1. SAE exploration worksheet 2./3. SAE Grading Rubric & conference https://www.theaet.com/SAERubrics 4. Rubric with	Various dates throughout the semester - 4 days total

opportunities for professional and civic service at work and in the community	and evaluate CDEs/LDES, various opportunities within the FFA (WLC, COLT, etc) 4. Reflect on experiences within FFA, SAE, and classroom to connect to life after high school	Activities					Conference (constructed response rubric- INFO tab) **Summative Assessment:** 1. 1-3- SAE Grading Rubric & Final Conference 4. Final reflection and rubric, (constructed response rubric- INFO tab) **SEE BELOW**	
CRP.10.- Plan education and career path aligned to personal goals.	1. Obtain OSHA 10- General Industry Certification	1. Explain commmon hazards in the workplace 2. Explain how to avoid or fix common hazards in the workplace 3. Obtain OSHA 10 Certification	1/2. Remember/Understand 3. Apply	1. Use of technology- Chromebook 2. Use of Career Safe software	OSHA Policies Various OSHA Vocabulary	OSHA 10	**CFAs:** Module Assessments- Proficiency 7/10 https://campus.careersafeonline.com/sign_in.k2 **Formative Assessments:** Final Assessment Proficiency Obtaining OSHA 10 Card	17 days

PST.01- Apply physical science principles and engineering applications to solve problems and improve performance in AFNR, Power, Structural, and technical systems	Describe and Demonstrate Safety, Set up, use, and tear down of the: 1. Oxy-gen/Acetylene Cylinders 2. Plasma Cutter 3. Arc Welder (SMAW) 4. MIG Welder (GMAW)	1. Explain and use the Oxygen-Acetylene Torch 2. Explain and use the Plasma Cutter 3. Explain and use the Arc Welder 4. Explain and use the MIG Welder	1-4: Remember, Understand, Apply, Create	Terminology of cutting and welding	Oxygen, Acetylene, Cylinder, SMAW, GMAW, ARC, MIG, STICK, Electrode, welder	Oxygen and Acetylene Cutting, Plasma Cutting, Arc Welding, MIG Welding	**CFAs**: Exit Tickets Cold Call Quizzing Both use response rubric 3/5 Prof. **Formative Assessments:** Demonstrated use of 4 machines/processes using project creation rubric 3/5 Proficiency Work Time Rubric: 3/5 Proficiency **SEE BELOW**	48 days
PST.04.- Plan, build, and maintain AFNR structures	1. Create a pictorial drawing of a projects 2. Create welding projects	1. Provide drawings of projects I would like to create 2. Weld projects	1-2: Apply, Understand, Create	Safety, set up, use and tear down of all equipment	Pictorial	Final Projects	**CFAs**: Response Rubric 3/5 Prof, Questioning during project **Formative Assessment:** Demonstrated use of 4 machines/processes using project creation rubric 3/5	21 days

							Proficiency Work Time Rubric: 3/5 Proficiency **SEE BELOW**	

DMACC Course Competencies
WEL 228 - Welding Safety/Health: SENSE1
Lecture Hours: 0 Lab Hours: 2 Practicum Hours: 0 Work Experience: 0
Course Type: Voc/Tech This course will provide students with orientation to the welding profession and will cover the basics of safety & health within the welding profession. This course aligns to SENSE Level 1, Module 1 and Module 2 - Key Indicators 1-6.
Competencies:
1. Understand the function of a welder in industry including knowledge of shop operations
Create time or job cards, reports or records.
Perform housekeeping duties.
Follow verbal instructions to complete work assignments.
Follow written instructions to complete work assignments.
2. Demonstrate proper safe operation practices in the work area, as described in ANSI Z 49.2 Section 4, Protection of personnel and the general area & ANSI Z 49, Part 1 General Aspects and applicable OSHA regulations.
Demonstrate proper use and inspection of personal protection equipment (PPE).
Demonstrate proper safe operation practices in the work area.
Demonstrate proper use and inspection of ventilation equipment.
Demonstrate proper Hot Zone operation.
Demonstrate proper work actions for working in confined spaces.
Demonstrate proper use of precautionary labeling and SDS information.

Welding II								
Power Standard	**Learning Targets**		**Level of Thinking (Bloom, Marzano, or Webb)**	**Implied Learning Targets/ Assumed Knowledge**	**Vocabulary**	**Unit**	**Assessments**	**Dates**
	Students will be able to.....	I CAN.....						
CRP.01- Act as a responsible and contributing employee/ CRP.01.03 - Identify and act upon opportunities for professional and civic service at work and in the community	1. Utilize the Iowa FFA and National FFA Website to research SAEs 2. Utilize AET website to maintain their SAE 3. Utilize Iowa FFA Website and National FFA website to research and evaluate CDEs/LDES, various opportunities within the FFA (WLC, COLT, etc) 4. Reflect on experiences within FFA, SAE, and	1. Identify a SAE 2. Maintain a record book on AET 3. Maintain a SAE 4. Participate in FFA activities	1. Remember/ Understand 2. Apply 3. Apply/create /evaluate 4. Apply	1. Knowledge of SAE, AET, FFA	SAE AET FFA Record Book	FFA Co-Curricular	**<u>CFAs:</u>** Regular checkpoints: 1. SAE exploration worksheet 2./3. SAE Grading Rubric & conference https://www.theaet.com/SAERubrics 4. Rubric with Conference (constructed response rubric- INFO tab) **<u>Summative Assessment:</u>** 1. 1-3- SAE Grading Rubric & Final Conference 4. Final reflection and rubric, (constructed response rubric- INFO tab)	4 Days

	classroom to connect to life after high school							
CRP.10.- Plan education and career path aligned to personal goals.	1. Obtain post-secondary credit for blueprint reading	1. Explain common welding symbols/blueprints 2. Explain common welding tools/fixtures	1/2. Remember/ Understand 3. Apply	1. Use of technology- Chromebook 2. Use of blueprint Handbook		Blueprint Reading	**CFAs:** Regular checkpoints: 1. Section1-5 Tests, 0-24=0, 25-49-1, 50-74=2, 75-89=3, 90-95=4, 95-100= 5 Performance rubric **Summative Assessment:** 1. Final Blueprint Exam, 0-24=0, 25-49-1, 50-74=2, 75-89=3, 90-95=4, 95-100= 5 Performance rubric	20 Days
PST.04.- Plan, build, and maintain AFNR structures	1. Create a pictorial drawing of a projects 2. Create welding projects	1. Provide drawings of projects I would like to create 2. Weld projects	1-2: Apply, Understand, Create	Safety, set up, use and tear down of all equipment	Pictorial	Final Projects	**CFAs for each project**: Response Rubric 3/5 Prof, Questioning during project **Formative Assessment for each project:** Demonstrated use of 4 machines/processes using project creation rubric 3/5 Proficiency Work Time Rubric: 3/5 Proficiency	66 Days
DMACC Competencies								
WEL 233 - Print Read/Sym Inter: SENSE1								
Credits: 3								

Lecture Hours: 3
Lab Hours: 0
Practicum Hours: 0
Work Experience: 0
Course Type: Voc/Tech provides instruction in interpreting elements of welding prints (drawings or sketches), focusing on measurement, American Welding Society welding symbols, and fabrication requirements. Students will understand how to prepare, assemble and tack welding parts according to drawings or sketches, using proper materials and tools. This course aligns to SENSE Level 1 Module 3: Drawing and Welding Symbol Interpretation, Key Indicators 1 and 2. Students will not receive credit for both WEL 233 and WEL 111.
Competencies
1. Evaluate welding drawings or sketches.
Locate information in AWS A3.0 Standard Welding Terms and Definitions.
Identify line types, dimensions and tolerances.
Understand line types, dimensions and tolerances.
Comprehend drawing notes.
Interpret elements of a title block and bill of material.
2. Interpret welding symbol information.
Locate information in AWS Documents including AWS A2.4 Standard Symbols for Welding, Brazing and Non-Destructive Examination.
Identify elements of welding symbols.
Explain application of welding symbols.
3. Perform conversion between US and SI units.
Complete conversions within US units.

Complete conversions within SI units.
4. Produce a multi-view sketch.
Create a side view, front view and top view drawing of an element.
Generate dimensions for drawings.
Add welding symbols to drawings.
5. Evaluate quality as it relates to producing parts from prints.